

Tunnel Boring and Other Underground Works of the KVMRT SBK Line

TUNNELLING AND UNDERGROUND SPACE TECHNICAL DIVISION



By Ir. Khoo Chee Min

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Participants during the session

The Tunnelling and Underground Space Technical Division (TUSTD) organised an evening talk on Tunnel Boring & Other Underground Works Of The KVMRT SBK Line on 17th November 2014, at the C&S Room, Wisma IEM.

The speaker was Mr. Gusztav Klados, Project Manager of MMC-Gamuda KVMRT (T) Sdn Bhd for the KVMRT Sungai Buloh - Kajang Line (SBK Line) Underground and Tunnelling Works. A total of 64 participants had attended the talk.

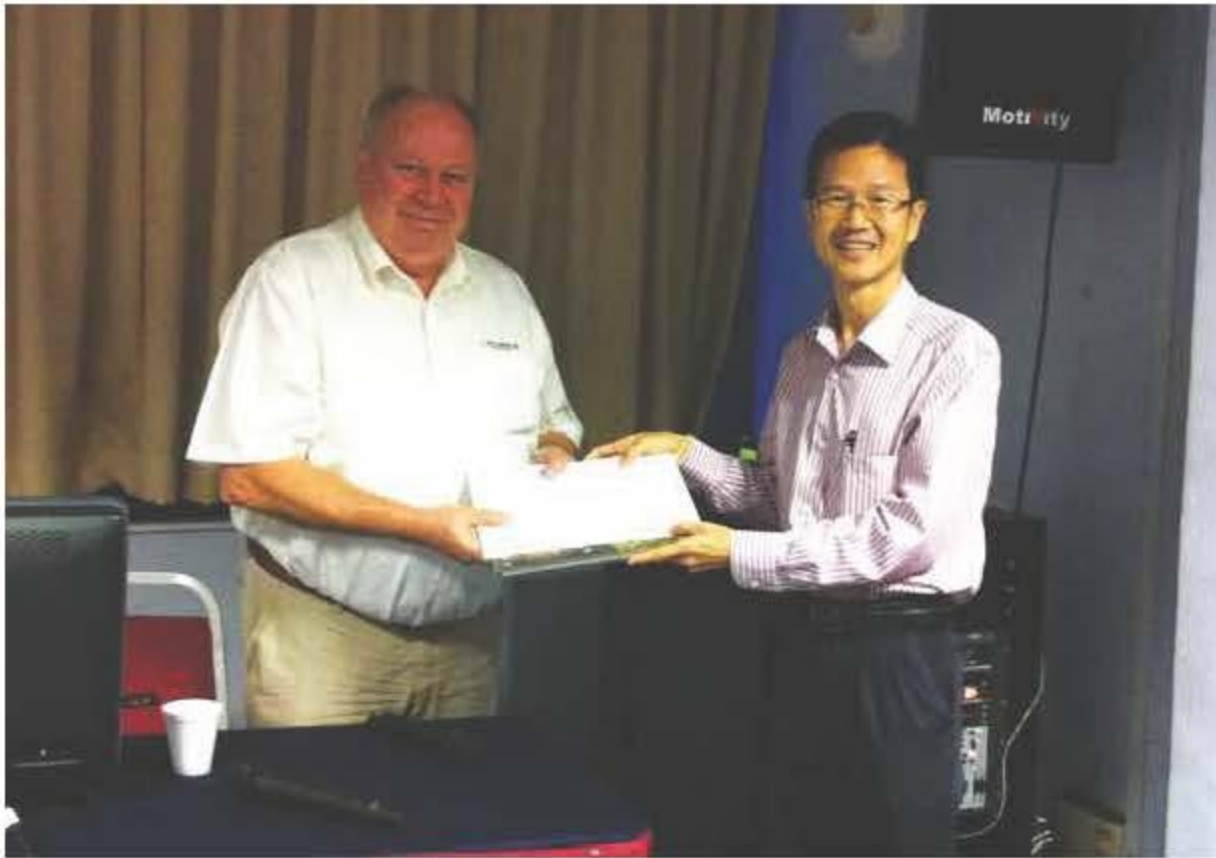
Mr. Gusztav started the talk with a brief overview of SBK Line, the first line currently implemented under the Klang Valley Mass Rapid Transit project in Malaysia. When completed, the SBK Line will measure a total length of 51km and have 7 underground stations and 24 elevated stations.

The talk focused on the underground section, including the 9.5km tunnelling within the KL city centre.



The speaker, Mr. Gusztav Klados

The tunnels are being constructed by two types of tunnel boring machines (TBM). These are Earth Pressure Balance (EPB) TBM for the



Memento presented to Mr. Gusztav by Ir. Andrew Yeow

Kenny Hill Formation and Variable Density (VD) TBM for the extreme karstic limestone formation. The VD TBM is a slurry machine designed for several modes of tunnelling, both in slurry and EPB, with a facility to vary the density of the slurry. The VD TBM works on a two-pronged approach towards minimising tunnelling risk, primarily caused by ground settlement:

- Higher viscosity slurry prevents loss of slurry into the cavities and this in turn prevents sinkholes
- Higher viscosity slurry prevents slurry from flooding the ground surface, hence helping to maintain the pressure between the cutterhead and the excavated surface, therefore minimising incidence of sinkholes.

This technological innovation is the first of its kind in the world and the contractor is proud to announce that the tunnelling in KL karst limestone has been completed successfully by VD TBM with just 2 minor sinkholes reported.

This is a major improvement compared to SMART project (i.e. 41 major ground collapses). This translates to 4.6/km sinkholes for SMART vs 0.3/km sinkholes for KVMRT. Other new techniques in tunnelling for this project include the full adoption of steel fibre reinforced concrete (SFRC) tunnel segment lining with universal rings (7 + 1 key), except hybrid lining to be used for certain areas (e.g. Pudu).

Mr. Gusztav then highlighted the key design features and engineering challenges faced at each underground station, of which some had been identified during tender and design stages while new challenges were encountered during construction. All 7 underground stations were being constructed using cut-and-over method with maximum excavation depths of up to 40m below ground level for the Tun Razak Exchange (TRX) Station.

For those in the Kenny Hill formation, construction followed the top-down process while those in KL limestone were designed for bottom-up sequence. Mr. Gusztav also shared his opinion that top-down construction was preferred and could be more economical than conventional braced excavation with extensive temporary strutting.

Apart from the above, the talk also provided participants with the latest updates on the KVMRT project with regards the progress of the various components of the underground section.

At the end of the talk, there were discussions and questions raised by the participants. Then the Chairman of TUSTD presented a memento to Mr. Gusztav, followed by a round of applause from the participants. ■